



MQ-1168 Evaluation Board Users Guide

Board Revision 2

INTRODUCTION

This guide is intended to give a brief overview of the MQ-1168 and describe the features and workings of the MQ-1168 / PCI Evaluation Board. This includes how to locate connectors, configure switches, configure jumpers, and the initialization and configuration of this Evaluation board with the PC motherboard with PCI interface as well as other platforms by using special adapters.

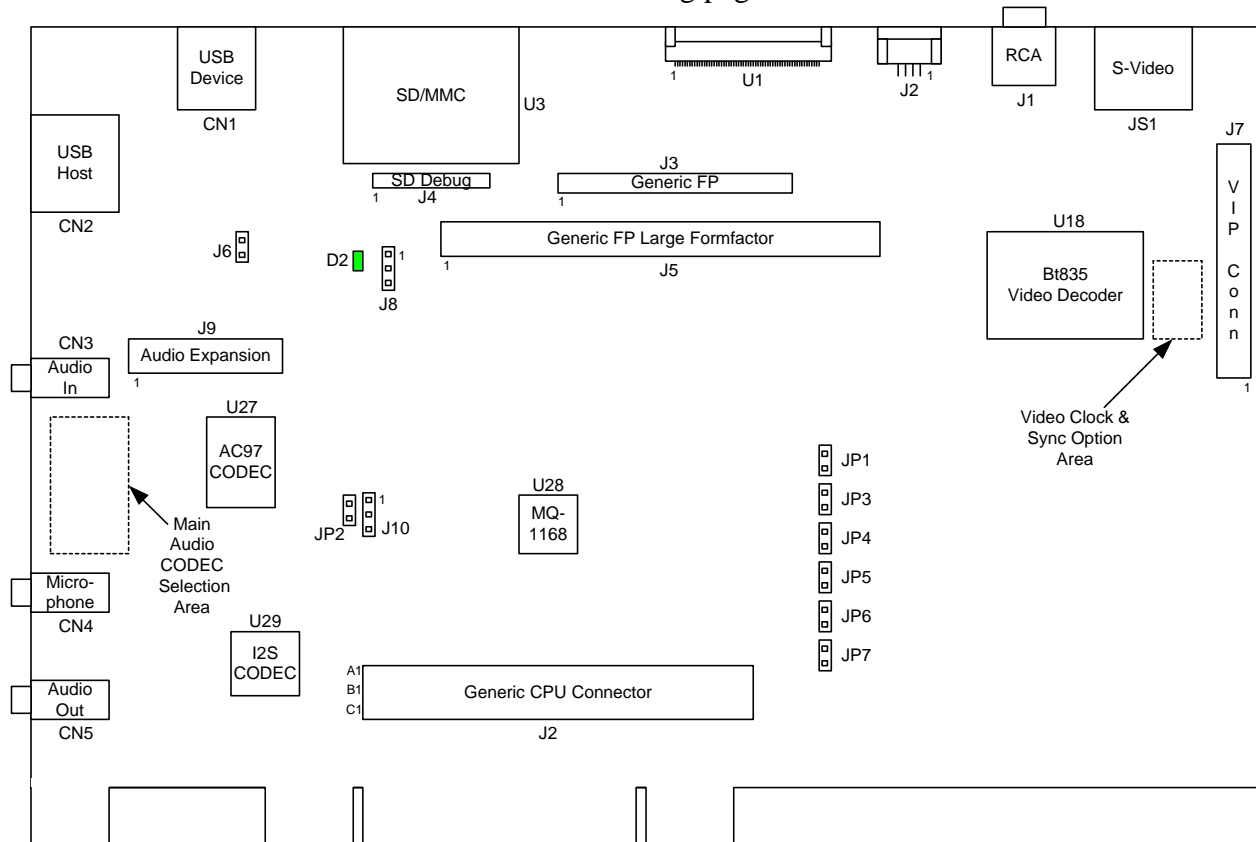
MQ-1168 OVERVIEW

The MQ-1168 is the second generation product in the MQ-11xx series from MediaQ. This device provides rich video and audio functions in addition to high performance graphics and high speed peripherals designed to give the user a complete multimedia experience. The MQ-1168 integrates a 64-bit 2D graphics engine, a flexible LCD display interface, dedicated Video Input port (VI), Secure Digital interface (SD), Serial Peripheral Interface (SPI), AC-97/I²S audio and USB controllers (function and host) on a single chip. The MQ-1168 has a 64-bit wide internal bus to 320KBs of embedded memory providing scalable bandwidth of up to 384MB/sec for the frame, video, USB and audio buffers. The MQ-1168 directly supports connection to the Intel SA-1110 and PXA2x0, the Motorola Dragonball series, the NEC VR-4100 family and the Hitachi SH-3/SH-4 CPUs as well as 32bit PCI.

PLATFORM DESCRIPTION

When installed into a PCI slot of a standard PC motherboard, the Evaluation Board can provide a development and verification platform for hardware and software. Using an adapter card, specified at the time of order placement, the Evaluation board can also be used in conjunction with other development environments. Adapters are currently available for the Intel PXA2X0 Lubbock, SA-1110/1111 Assabet/Neponset, Palm Hurricane, Hitachi S1 (or equivalent) and NEC VR4121 Falcon development platforms.

The location of the connectors, jumpers and other notable features are shown on the layout diagram below. These are described in the tables on the following pages.



Reference	Type	Description
J2-A/B/C	75-pin, 0.1", 3x25, male header	Generic CPU interface
U1	50-pin flex cable socket	Sharp HR TFT connector
J3	60-pin, 50 mil, 2x30, male header	Generic flat panel connector
J5	60-pin, 0.1", 2x30 male header	Large form factor generic flat panel connector
CN3/4/5	Phone jack	Audio input, Microphone and output connectors
J9	20-pin, 0.1", 2x10, male header	Audio debug/expansion connector
CN1	USB type B	USB type B device connector
CN2	USB type A	USB type A host connector
J2	4-pin flex cable socket	Touchscreen connector for Sharp HR TFT
J1	Video RCA Jack	Composite Video Connector
JS1	S-Video Connector	S-Video Connector
J7	30-pin, 0.1", 2x15, male header	Video Input debug/expansion connector
U3	SD/MMC	Secure Digital and Multi Media Card socket
J4	8-pin, 0.1", 1x10 male header	SD/MMC debug connector

Miscellaneous

Reference	Type	Description
D2	LED	Used to test GPIO 54 functionality

Jumpers

Reference	Type	Description
JP1, JP4, JP3, JP2, JP7, JP5, JP6	2 pin header	Power measurement jumpers for FVDD (flat panel), BVDD (Bus), PVDD (USB), AVDD18 (Oscillator), AVDDP1/2 (PLL1/2), MVDD (SRAM) and CVDD (Core). Normal operation requires either these jumpers or resistors R208, R209, R210, R211, R215, R216 and R217 installed.
J6	2 pin header	Sets strapping for GPIO3 which selects the mode of the GPIO4/PDWN# pin. GPIO4 enabled (J6 not installed) or PDWN# enabled (J6 installed). When J6 is installed (PDWN# mode), the audio functionality is lost.
J10	3 pin header	Selects powerdown mode that disables the CPU interface (1-2) or normal operation (2-3). Power down mode is only possible if J6 is not installed (PDWN# pin mode selected)
J8	3 pin header	GPIO54 used to drive LED (2-3) or available for use for Secure Digital Write Protect GPIO (1-2). When used with the LED, the write protect functionality is lost.

Stuffing Options

Reference	Type	Description
R118/R119	Various	Determines whether Xtal or external oscillator is used. For Xtal operation, install Xtal Y3 and remove R118 and R119. For external oscillator operation, remove Xtal Y3 and C121 and for 1.8V oscillators or to drive OSCO at 3.3V, install R118 (0 ohm) and remove R119. To drive OSCO at 1.8V with 3.3V oscillator, install R118 (120 ohm) and R119 (150 ohm).
R6,R7	0 ohm resistors	Determines whether FP_VSCAN_DIR/FP_HSCAN_DIR are pulled up to 3.3V from the bus (R7 installed) or from the on-board regulator (R6 installed)
R44, R52, R54, R57, R58, R60, R62, R65, R66, R68, R71, R73, R110, R112, R113, R115	0 ohm resistors	Installed in order to use Philips UDA1341TS I2S CODEC, removed when AC97 CODEC used
R43, R51, R53, R56, R59, R61, R64, R67, R70, R72, R78, R92		Installed in order to use Crystal CS4021 AC97 CODEC, removed when I2S CODEC used
R25, R33	0 ohm resistors	Brooktree decoder video clock source is gated clock (R25) or ungated CLK2 (R33). The gated clock is assumed by our software at present.

FUNCTIONAL DESCRIPTION

CPU Interface

The Evaluation card can be used as is in a PCI system. For other supported platforms an adapter is installed on the back of the board mating with J2. Details of which adapters are available and how to use them are contained in the section “Adapters” later in this document. The CPUs supported by this means are the Intel SA-1110 and PXA2x0, Motorola Dragonball, NEC VR4121 and Hitachi SH7709/7750. Care should be taken to ensure that pins A1/B1/C1 match on the main board and adapter. When used in a PCI system, the adapters must be removed or damage can occur to the Evaluation board and/or system. The user must support the panel, Evaluation Board (non-PCI environment) and adapter to avoid undue strain on the various connectors.

Flat Panel Interface

The Evaluation board has three connectors intended for interfacing to a variety of flat panel displays. Connector U1 is used to interface directly to a Sharp HR TFT display (LQ039Q2DS54 or equivalent). The Evaluation board has all the necessary power and power sequencing circuitry necessary for this panel. The Sharp HR TFT flat panel cable can be connected to the Evaluation board as follows:

- Lift the brown lever on the HR TFT socket (U1)
- Insert flat cable with exposed portion facing up over the lever and under the top of the socket
- Push down the brown lever – this should lock the cable into place and make electrical connection

Two Generic Flat Panel connectors (J3 and J5) are provided to allow the Evaluation board to be interfaced with a wide variety of LCD panels other than the Sharp HR TFT. Custom cables are required to map the panel signals onto the proper MQ-1168 pins, details of the LCD panels already verified by MediaQ can be obtained from our web site. A custom cable will require a matching female connector to mate with either of the 60-pin connectors J3 or J5, these connectors also supply various power rails. The connector J3 is a 50-mil, 2x30 male connector and J5 is a 0.1” 2x30 standard header. The matching female 50 mil spaced connector part number is M50-3003022. The mating connector for the 0.1” header is readily available in many variations.

The pin assignments for the generic connectors are the same and shown below:

Pin	Signal	Signal	Pin
1	GND	FVSYNC	2
3	R0	GND	4
5	GND	B5	6
7	R1	GND	8
9	GND	B4	10
11	R2	GND	12
13	GND	B3	14
15	R3	GND	16
17	GND	B2	18
19	SCLK	GND	20
21	GND	B1	22
23	PWM1	GND	24
25	PWMCON0	B0	26
27	R4	GND	28
29	FLCLK	G5	30

Pin	Signal	Signal	Pin
31	R5	GND	32
33	GND	G4	34
35	G0	GND	36
37	FMOD	LP	38
39	G1	GND	40
41	GND	DESPL	42
43	G2	GND	44
45	GND	ENVEE	46
47	G3	3.3V*	48
49	GND	3.3V*	50
51	5V*	GND	52
53	-11_7V*	GND	54
55	-15V*	GND	56
57	+15V*	GND	58
59	FP_MODE	NC	60

Care must be taken when fabricating cables to ensure that pins do not short together as this could cause damage to either the MQ1168 or the panel and even in some instances to both.

Touch Screen / MMC

The Evaluation board supports a touch screen controller connected to the SPI interface of the MQ-1168 controller. Connector J2 mates with the flat cable connected to the touch panel provided with the Sharp HR TFT display (LQ039Q2DS54). To install the cable, pull out the sliding black portion of the socket, insert the cable bare metal side up and then push the black portion back in locking the cable in place.

USB

Two USB connectors are provided on the Evaluation board. CN2 is a Type A USB connector and provides the USB Host functionality of the MQ-1168. CN1 is a Type B connector and provides the USB Device function. Since the MQ-1168 USB device is a high speed device, CN1 is configured as such.

Video

The board includes a Conexant Video Decoder (Bt835) which outputs VIP data compatible with the MQ-1168. Both composite and S-Video input sources are supported on J1 and JS1 respectively. In addition, J7 makes all the MQ-1168 video related signals available on a 30-pin standard 0.1" header. This can be used to observe the signal activity with test equipment or to allow external VIP compliant digital video data to be sent to the MQ-1168 instead of using the onboard decoder.

Secure Digital

The MQ-1168 Secure Digital interface is used to support either SD or MMC cards installed in the SD socket (U3). Card detect and write protect functions are implemented.

Audio

The Evaluation board supports audio input and playback/output using either of the onboard audio CODECs. Both a Philips I2S and Crystal AC97 audio CODEC are implemented on board. Stuffing resistors are used to select between the two.

Audio input can come from any amplified or non-amplified audio source and uses the Phone Jack CN3. Amplified audio output to headphones, amplified speakers or other destinations is available on the Phone Jack CN5. A mono or stereo microphone can be connected to the Phone Jack CN4.

Power

Power is provided by the PCI interface or CPU adapter card when used. The 1.8V and 3.3V power supplies required by the MQ-1168 are provided by regulators on the Evaluation board which are powered off the PCI bus or adapter card. The rest of the board is powered directly by the PCI bus or adapter card.

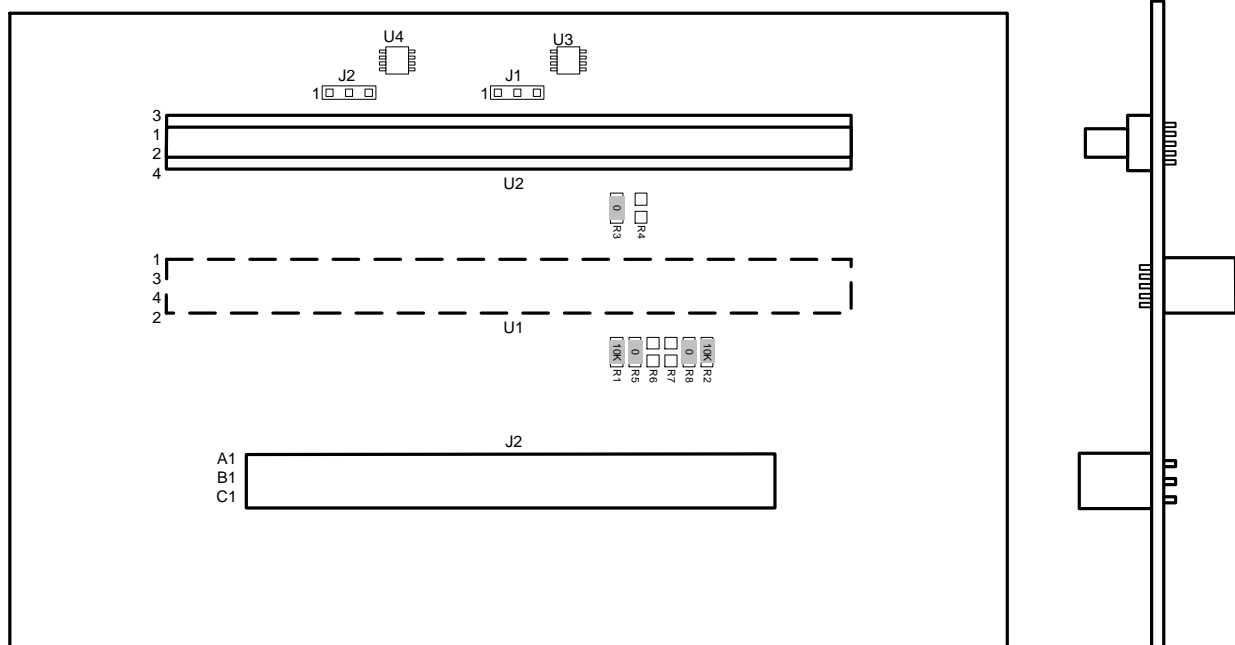
ADAPTERS CARDS

The Evaluation board can be used with other platforms besides PCI. To accomplish this, adapters are used that interface to a special connector on the Evaluation board and mate with the unique connectors used on the various target platforms. At this time adapters are available to support the following platforms:

- Intel SA-1110/1111 Development Platform (Assabet/Neponset)
- Intel PXA2x0 Development Platform (Lubbock)
- Palm Development Platform (Hurricane)
- Motorola Dragonball Development Platform
- NEC VR4121 Development Platform (Falcon)
- Hitachi SH7709/SH7750 Development Platforms (S1 or R1)

When used in a PCI system, the adapters must be removed or damage can occur to the Evaluation board and/or system. The follow sections describe the various adapter cards and their usage.

SA-1110 Platform (Assabet) and Lubbock platform Adapter



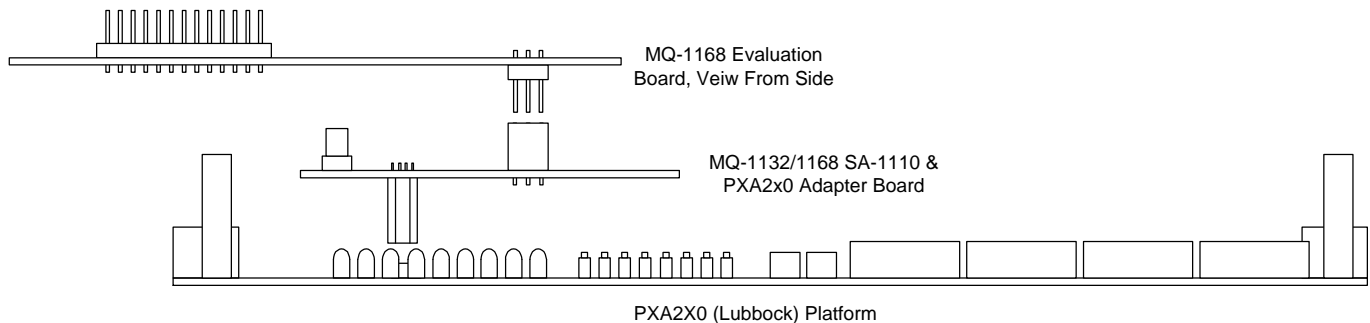
As shown above, the adapter for the Assabet/Lubbock platforms has three connectors. J2 mates with the “Generic CPU” connector located on the back of the Evaluation board. Connector U1 mates with either of the female connectors on the Assabet platform. This connector is keyed so cannot be installed incorrectly. Connector U2 is not used with the Evaluation board.

The adapter can be configured to work on either the Assabet or Lubbock platforms. This is done by installing three 0 ohm resistors in R3, R5 and R8 (Assabet) or R4, R6 and R7 (Lubbock). The diagram above shows the adapter configured for the Assabet platform.

Jumpers J1 and J2 are used to select the 3.3V (J2) and 5V (J1) power sources for the Evaluation board. Jumping 1-2 selects power directly from the bus while 2-3 selects power from the regulators on the adapter that receive their power from the AC adapter used by the platform.

Lubbock Platform

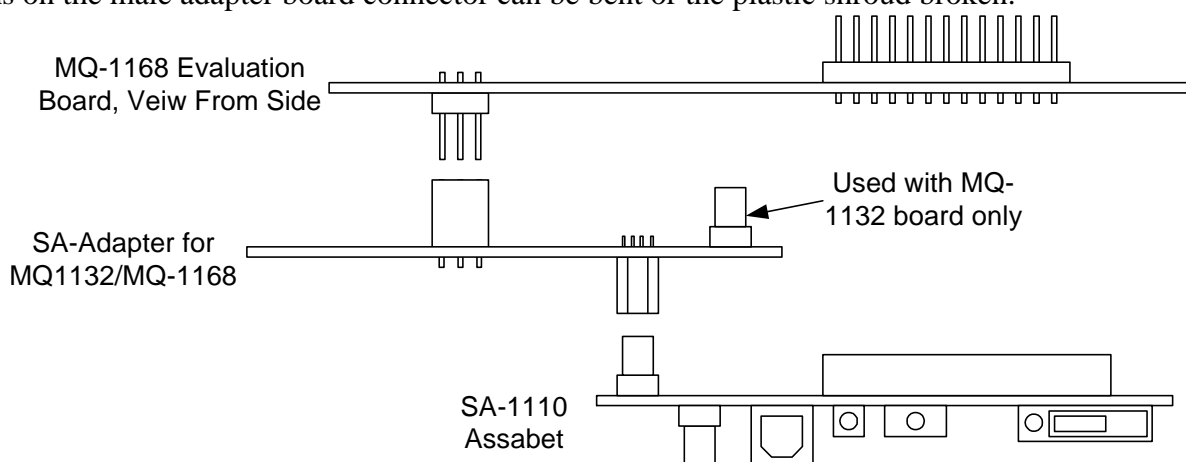
The Lubbock platform has a single 140-pin connector, J26 that interfaces to the adapter board (described earlier) that re-routes several signals necessary to work with the Evaluation board. The final assembly should resemble the diagram below which is a side view of the Lubbock platform and Evaluation Board.



The MQ1168 peripherals with the exception of the flatpanel interface need to signal the PXA2x0 on the Lubbock platform with an interrupt. Our device drivers have been ported to use GPIO 10/RTC on the Lubbock connector as the interrupt pin. GPIO 10 comes out on connector J21 pin 3 as defined in the Lubbock user guide on page 2-13. If you intend to use GPIO 10 you need to solder a wire from the MQ1168 interface card connector U2 pin 108 to Connector J21 pin 3. Other interrupt pins can be used by connecting them to Pin 108 of connector U2 on the interface card, however the drivers will need to be modified.

Assabet Platform

The diagram below shows how the Evaluation board, adapter board and Assabet platform are connected. Care should be taken to line up the pins correctly, especially A1/B1/C1. Also, when removing the adapter from the Assabet platform, care should be taken to ensure the boards come apart as parallel as possible or the pins on the male adapter board connector can be bent or the plastic shroud broken.



Care should be taken to ensure correct alignment of the sockets and plugs to prevent damage during assembly and disassembly. When removing either the Evaluation or Adapter Board from the platform, apply even pressure to both sides of the connector and keep the boards as parallel as possible to prevent damage to the Plug pins and moldings.

Lubbock Platform Configuration & Operation

Consult the documentation listed below relating to the Lubbock platform for instructions on how to configure and bring up that system.

SA-1110 (Assabet) Platform Configuration & Operation

The following instructions apply to using the Evaluation Board with the Intel StrongARM SA-1110 Reference Platform. The following components are required and should be included in the Intel SA1110/SA1111 development package:

- SA-1110 platform module (Assabet)
- SA-1111 developer platform module (Neponset)
- DC supply for platform
- Compact flash Ethernet card, CF to PCMCIA adapter and crossover cable
- Serial cable (10-pin female header to 9-pin female serial port connector)

Please note that no compact flash adaptor should be installed in the SA1110 board socket, as it will cause damage to the card and the bus drivers used to drive the MQ-1168 & SA1111 board's bus.

Software Download

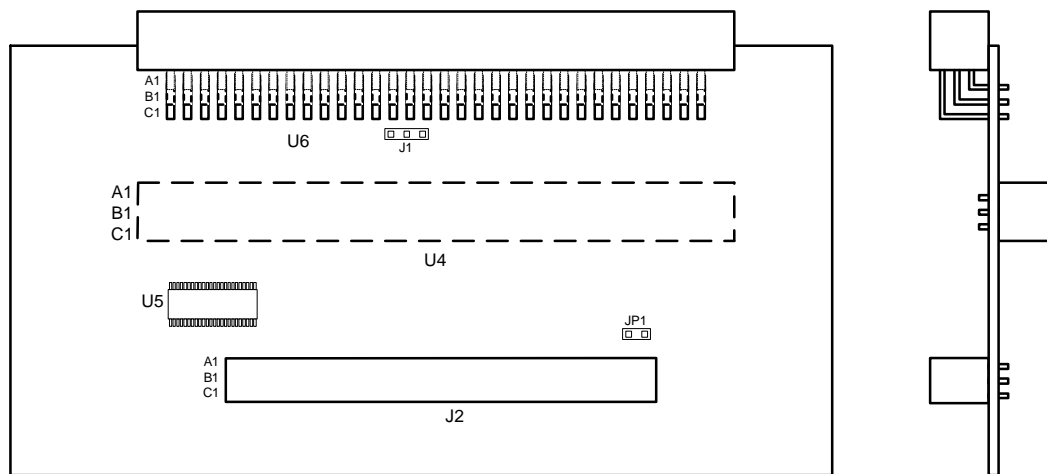
After the hardware is assembled, connect the serial and ethernet connectors to a properly configured host PC. The configuration of the host is beyond the scope of this document and should be covered in the StrongARM documentation. Following are the steps required to download a software image to the platform system memory.

1. Open a hyper-terminal on the host PC. The communication setting for Eboot is provided in the Intel document "Intel StrongARM SA-1110 Microprocessor Development Board Users Guide"
2. Open the Eshell on the host PC for Window CE shell
3. Power on the system and the hyper-terminal should print some messages and stop at the point "**Init DHCP()**"
4. Input an IP address here with the first three areas the same as your host PC setting (for example, if your host PC IP address setting is 192.168.1.128, you need an IP address 192.168.1.x. The network mask may not need to be set in which case, just press return and it will be set 255.255.255.x. Otherwise set the mask to 255.255.255.0. Hyper-terminal will print "**SENT BOOTME TO 255.255.255.x.)**"
5. In Eshell window, select the SA-1110 device as controller device in option and set configuration "**download only on command, unselect all other option**". If setup is correct, it will print out "**Got Bootme from SA11xxxxxx, ready for download**".
6. Select the desired binary file and proceed with download. It will display download status at the bottom left corner of the Eshell window.
7. After download, the system will reboot and execute the image file. For program information, refer to the Intel documentation.

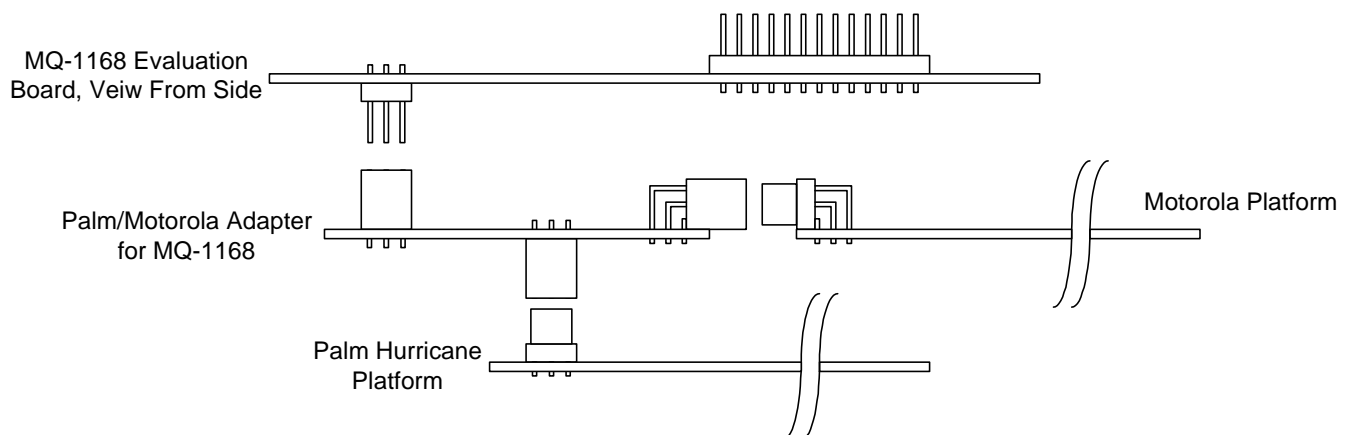
Following are the steps required to download a software image to the platform flash memory.

1. Download the Flash Memory Programmer (JFlash), version 1.2 from <http://developer.intel.com/design/strong/swsup/>
2. Unzip and read the readme.doc to setup the JFlash application. Run “jfsetup.bat.”
3. Note: Requires Intel Jtag cable. (P/N 70-11131-12 REV 2.1 044)
4. Download “Ebootdvw5.nb0” from <ftp://ftp.mediaq.com/sw/mq11xx/windowsce/utls/jflash/>
5. To Download image into the Neponset (SA1111) set dip switch 1, 2, 7 ON of the “SW2.”
6. To Download image into the Assabet (SA1110) set dip switch 1, 2, 7, & **8** ON of the “SW2.”
7. Once “Ebootdvw3.nb0” is flashed into the platform, select “Ethernet loader without launch” to download image onto flash. Follow the steps required to download a software image to the platform system memory.
8. Once image download is done, select “Program to flash” from the hyper terminal to copy image into flash memory.
9. After program to flash is complete, perform cold boot.

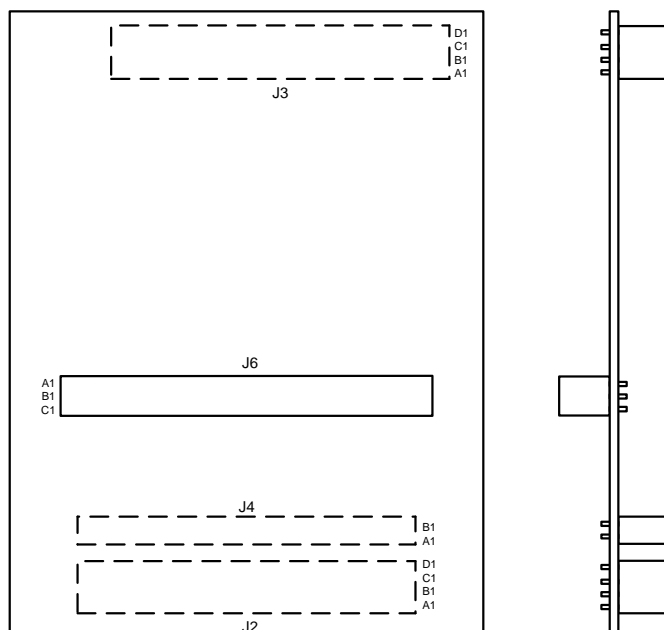
Palm & Motorola Dragonball Platform (Hurricane &) Adapter



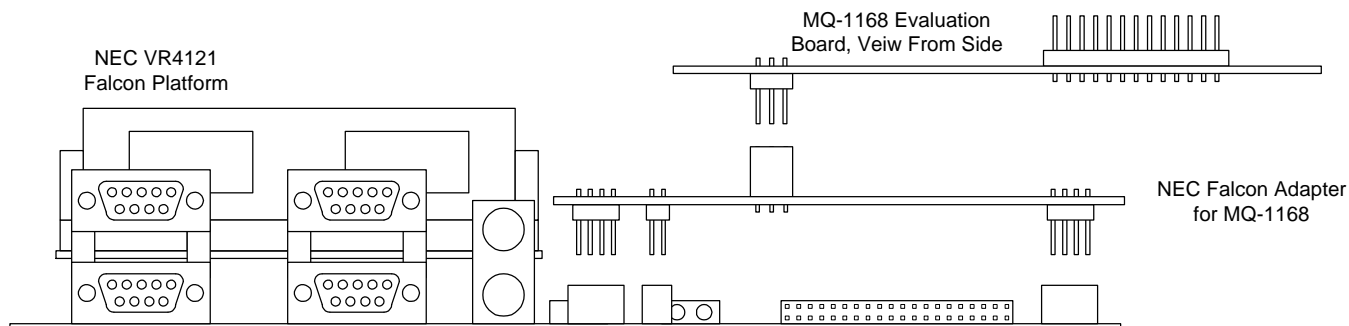
The diagram above shows the adapter for the Palm Development Platform (Hurricane) or the Motorola Development Platform. As with the other adapters, J2 mates with the “Generic CPU” connector located on the back of the Evaluation board. Connector U4 mates with the 96-pin female DIN connector on the Palm Hurricane Platform. Alternately, connector U6 can be used to connect to the Motorola Development Platform. These connectors are keyed so cannot be installed incorrectly. J1 selects which IRQ the MQ-1168 will connect to on the platform. Setting 1-2 selects IRQ2 while 2-3 selects IRQ3. The Evaluation board requires 3.3V and 5V power from the adapter board. The Palm/Motorola adapter passes the 3.3V power supplied on the platform connector but does not provide 5V. Connector JP1 is used to provide 5V and can be connected to an external source. A wire with a mating female 0.25” square connector can be attached to the 5V supply which does not go to the bus but is available on the platform. The diagram below shows how the Evaluation board, adapter board and Palm or Motorola platforms are connected. Care should be taken to line up the pins correctly, especially A1/B1/C1.



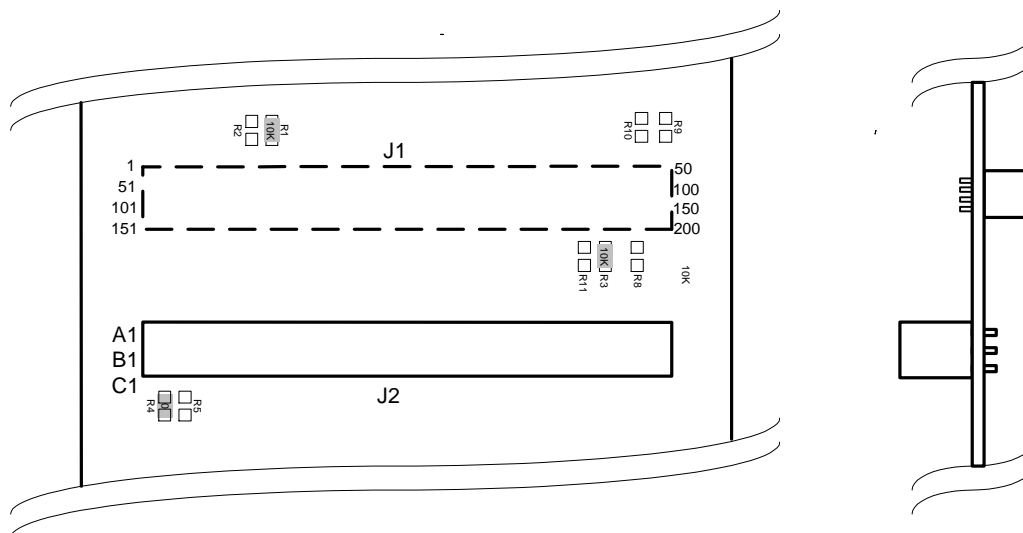
NEC VR4121 Platform (Falcon) Adapter



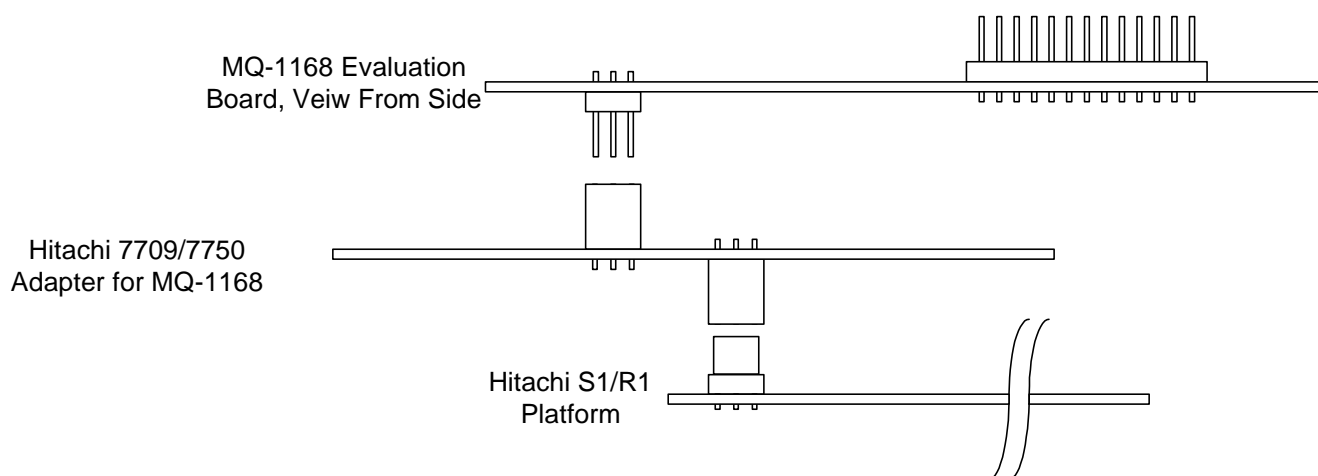
The diagram above shows the adapter for the NEC VR4121 Development Platform (Falcon). J6 mates with the “Generic CPU” connector located on the back of the Evaluation board. Male 2mm pitch headers J2, J3 and J4 mate with matching connectors on the NEC Falcon Platform. These connectors are not keyed and care should be exercised to line up the pins correctly. When removing the adapter from the platform, be very careful not to bend the pins. The diagram below shows how the Evaluation board, NEC Falcon adapter and NEC Falcon platform are connected.



Hitachi SH7709/7750 Platform (S1/R1) Adapter



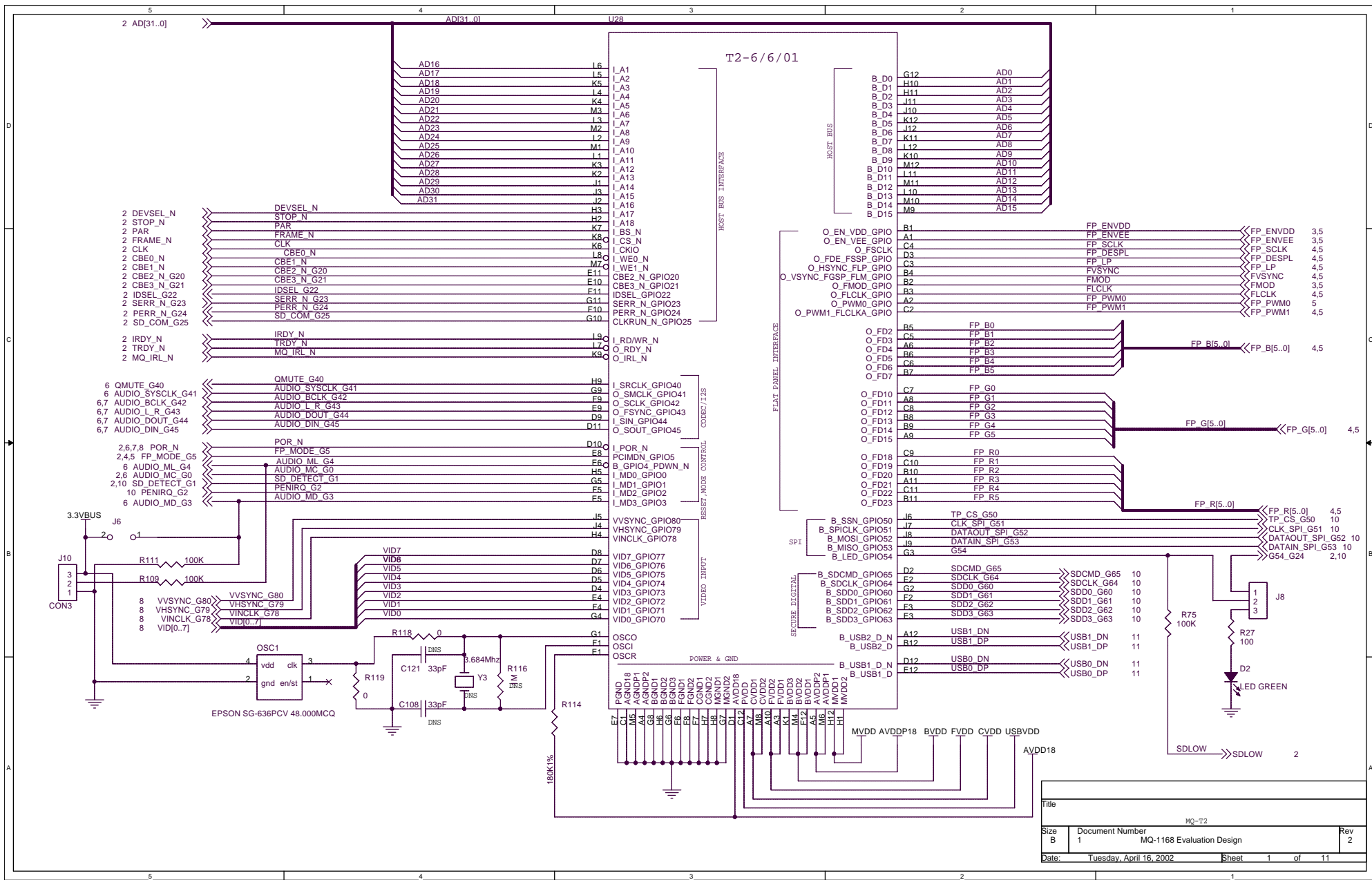
The adapter for the Hitachi 7709/7750 based Development Platforms (S1/R1) is shown above. J2 mates with the “Generic CPU” connector located on the back of the Evaluation board. The Male 0.05” pitch connector J1 mates with the matching connector on the Hitachi platforms. This connector is not keyed and care should be exercised so as not to plug the adapter in backwards. When removing the adapter from the platform, be very careful not to bend the pins. The adapter can be configured to work with either the Hitachi SH7709 or SH7750 CPUs. For the SH7709 also known as the SH3 processor, R1 (10K ohm resistor) and R4 (0 ohm resistor) should be installed. For the SH7750 also known as the SH4 processor, R2 (10K ohm) and R5 (0 ohm) should be installed instead. These changes set the MQ1168 CPU mode select and pull the RDY#/WAIT# line in the correct direction. Resistors R8, R9, R10 and R11 can be removed to isolate three of the power/ground pins and the interrupt pin for use on some platforms that were not completely pin compatible with the standard S1 connector. The diagram below shows how the Evaluation board, Hitachi 7709/7750 adapter and Hitachi platform are assembled.

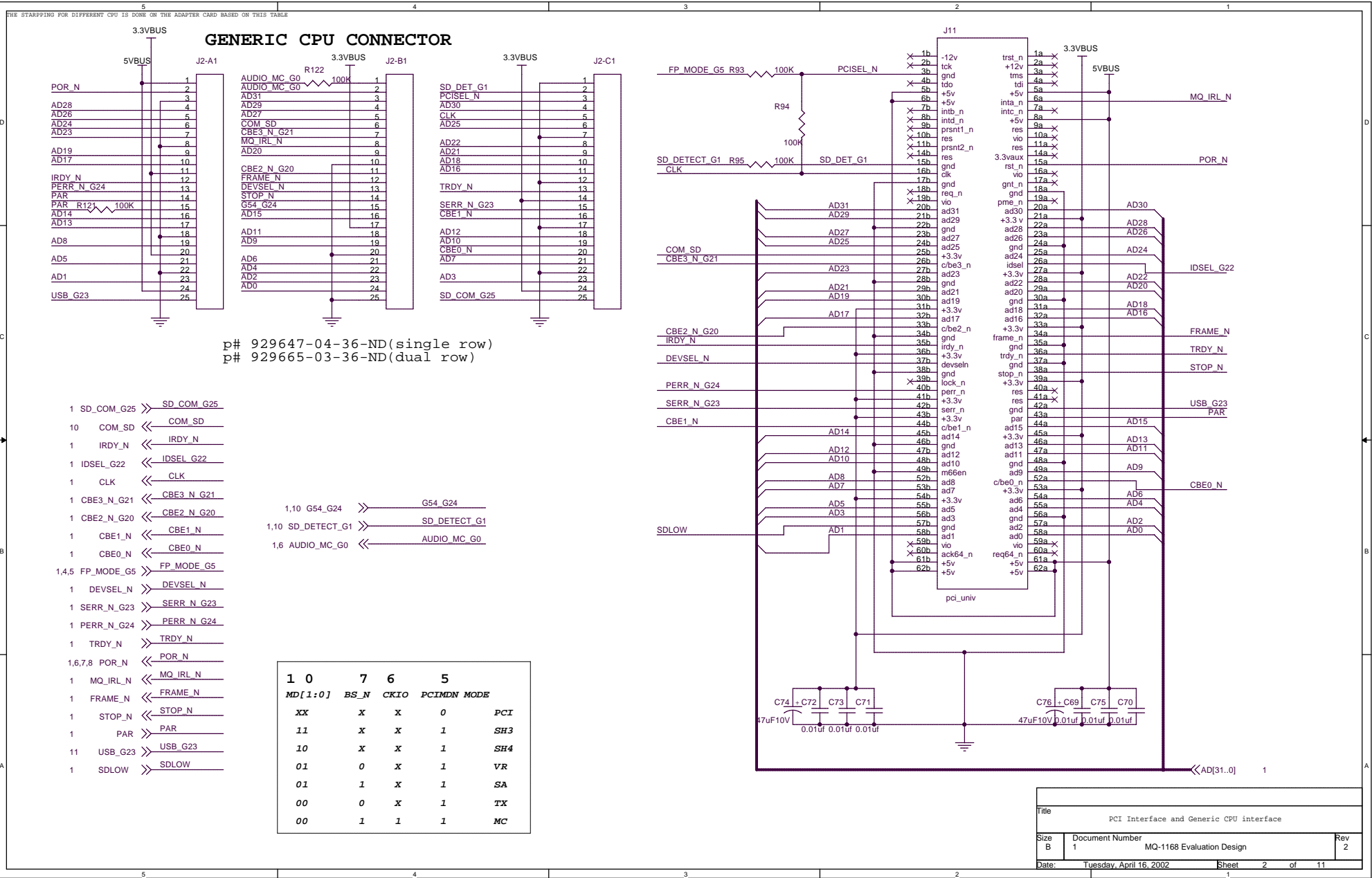


RELATED DOCUMENTATION

- MQ-1168 Multimedia Platform Controller Datasheet
- Flat Panel Support Application Note
- MediaQ Software release notes
- Intel® StrongARM® SA-1110 Microprocessor Developers Manual (278240-003)
- Intel® StrongARM® SA-1110 Microprocessor Development Board User's Guide (278278-005)
- Intel® StrongARM® SA-1110/SA-1111 Development Kit Start Procedures User's Guide (278339-002)
- Intel® StrongARM® SA-1110 Microprocessor Development Board Schematics (278279-006)
- Intel® PXA250/PXA210 Applications Processor Developers Manual (278522-001)
- Intel® DBPXA250 Development Platform for Intel ® PCA Quick Start Guide (278403-001)
- Intel® DBPXA250 Development Platform for Intel ® PCA User's Guide (278419-001)
- Intel® BBPXA2XX Development Baseboard Schematic Diagram (278424-001)

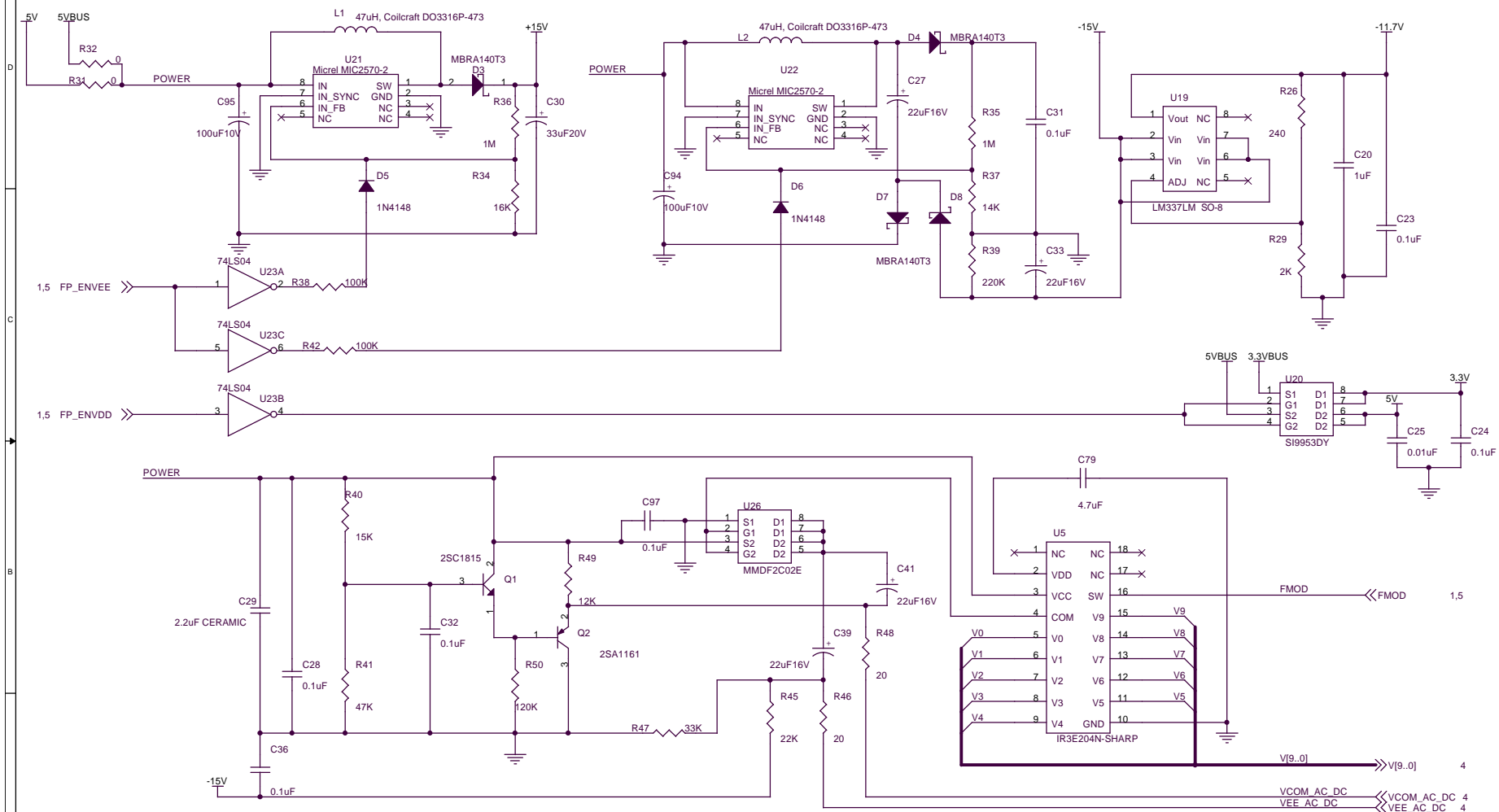
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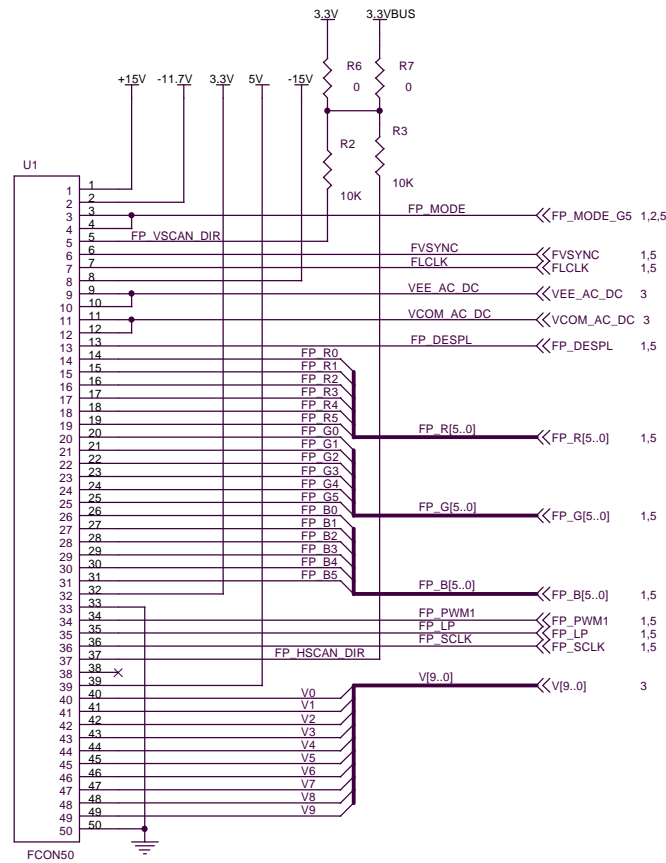
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PCI Interface and Generic CPU interface			
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HR TFT FLAT PANEL INTERFACE PAGE 1



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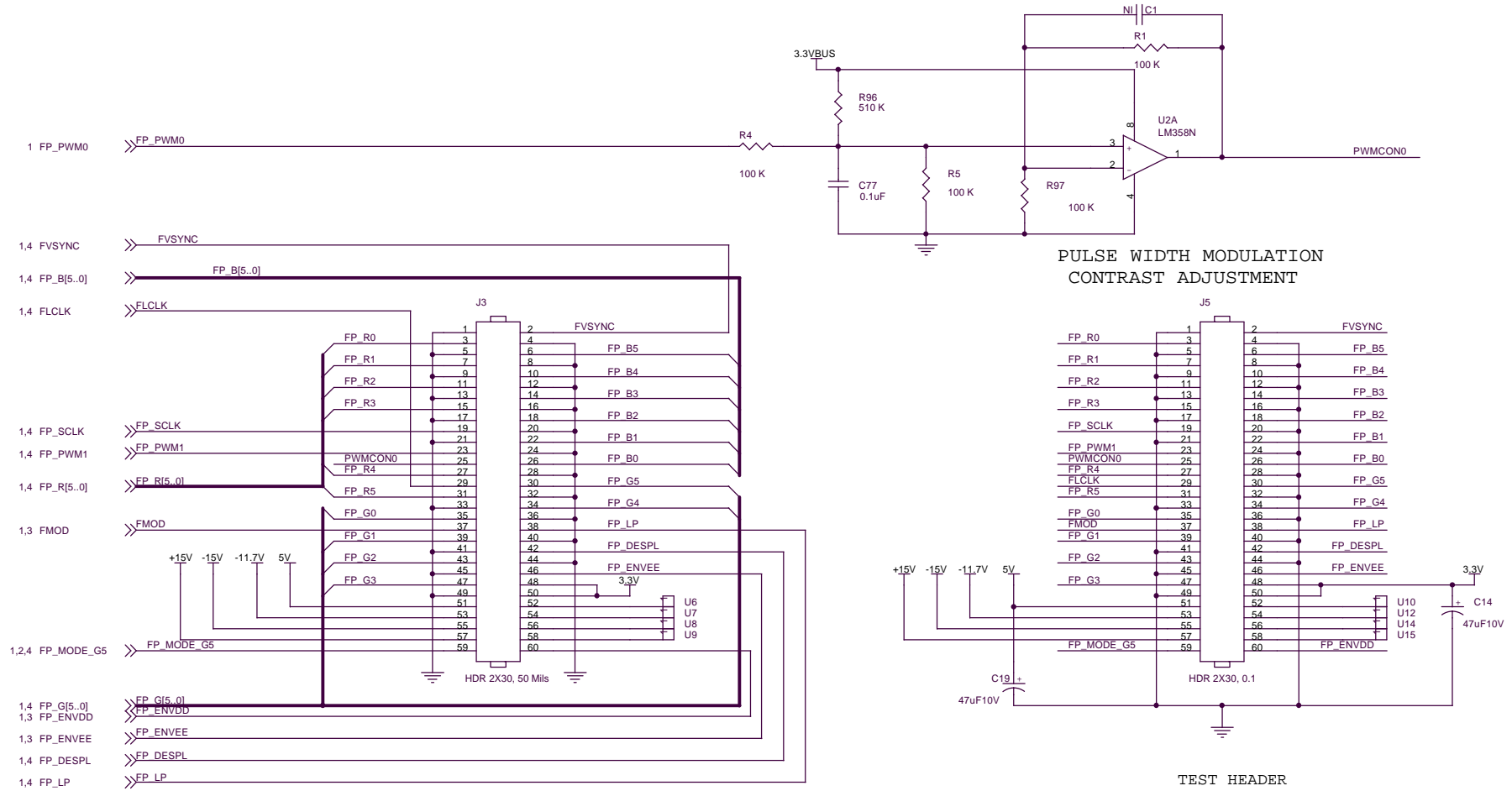
HR TFT FLAT PANEL INTERFACE PAGE 2



SHARP HR TFT INTERFACE

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GENERIC FLAT PANEL INTERFACE

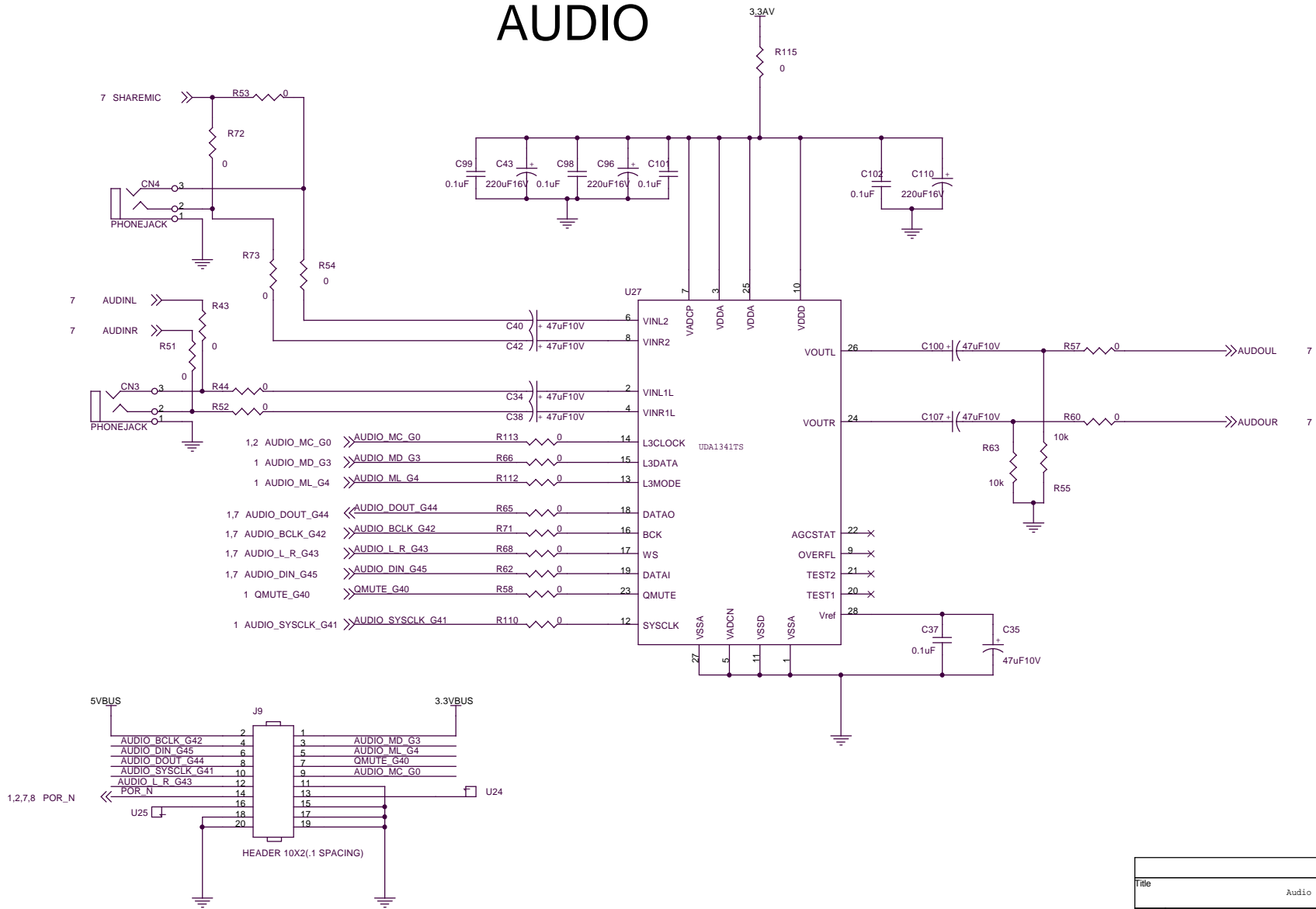


GENERIC FLAT PANEL INTERFACE

TEST HEADER

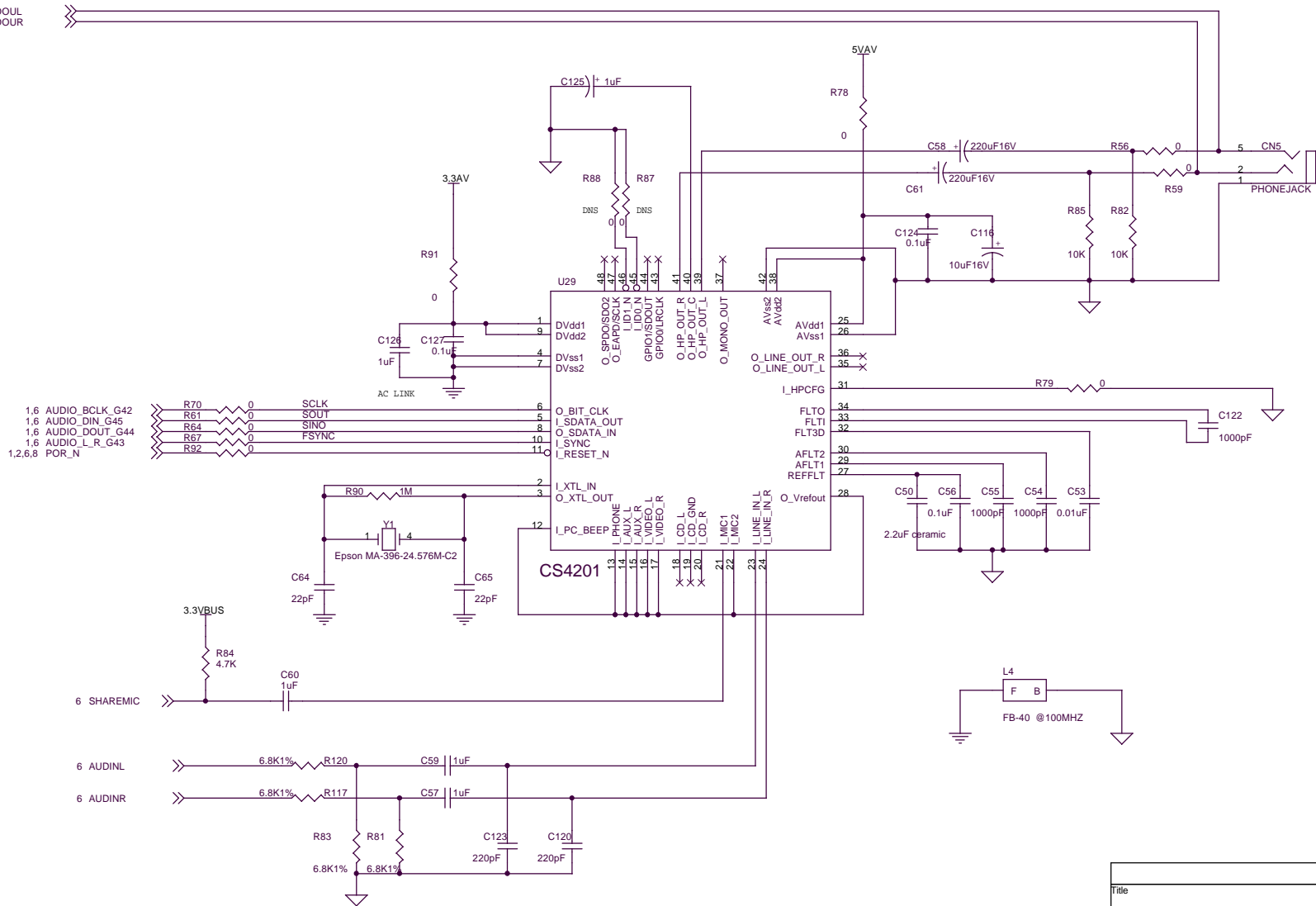
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Generic Flat panel interface			
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AUDIO

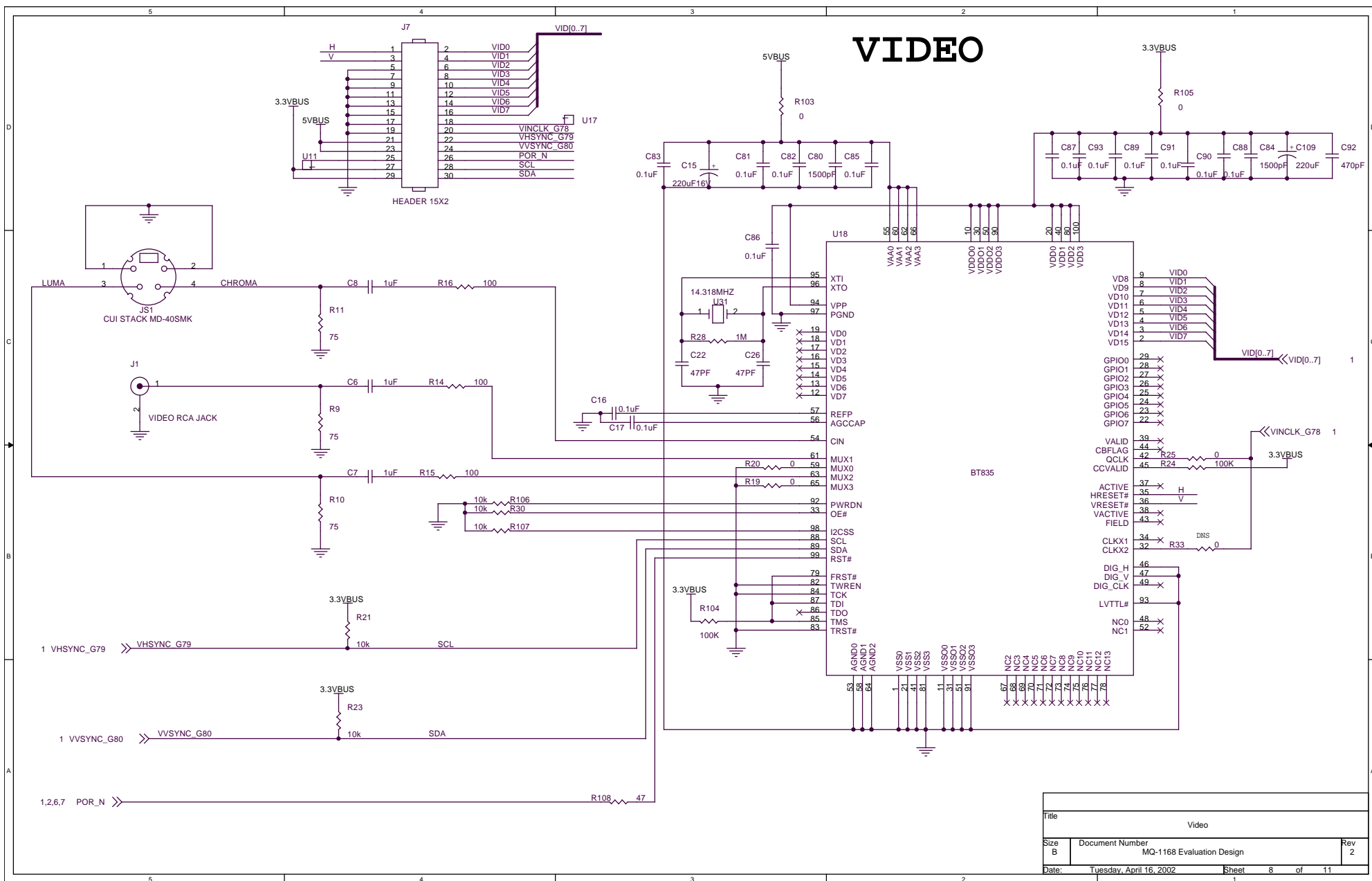


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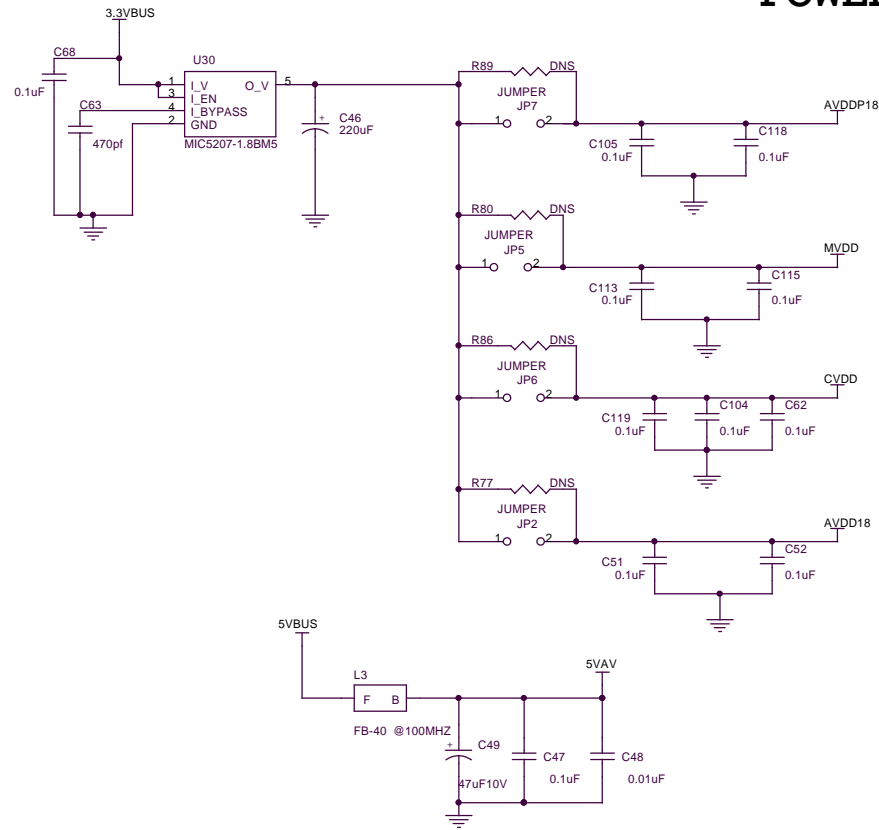
DNS AUDIO AC 97



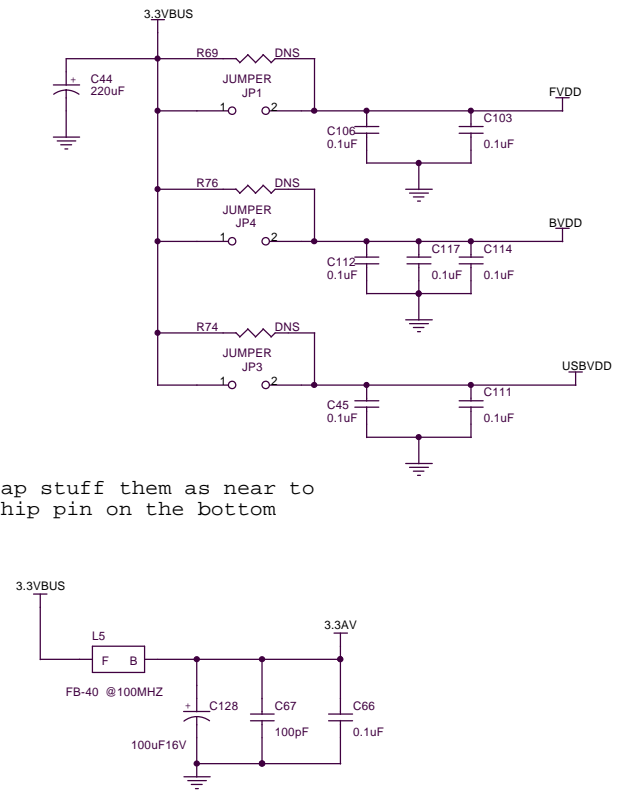
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POWER

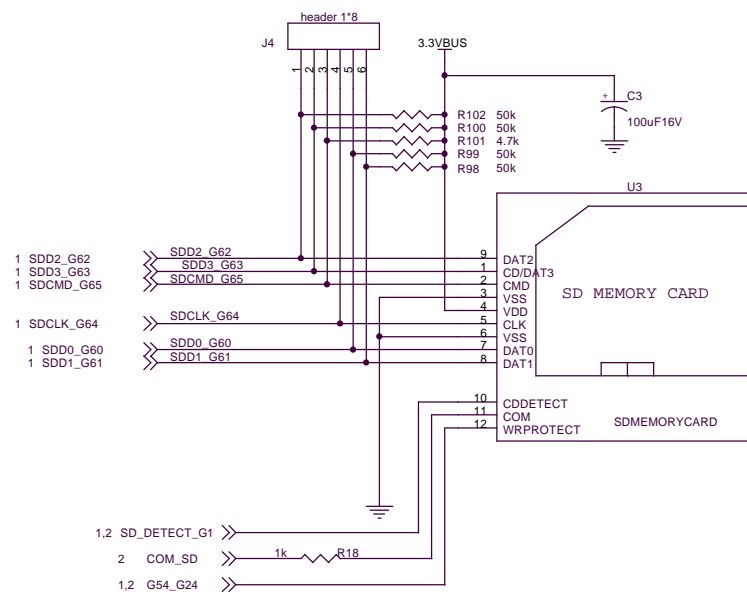
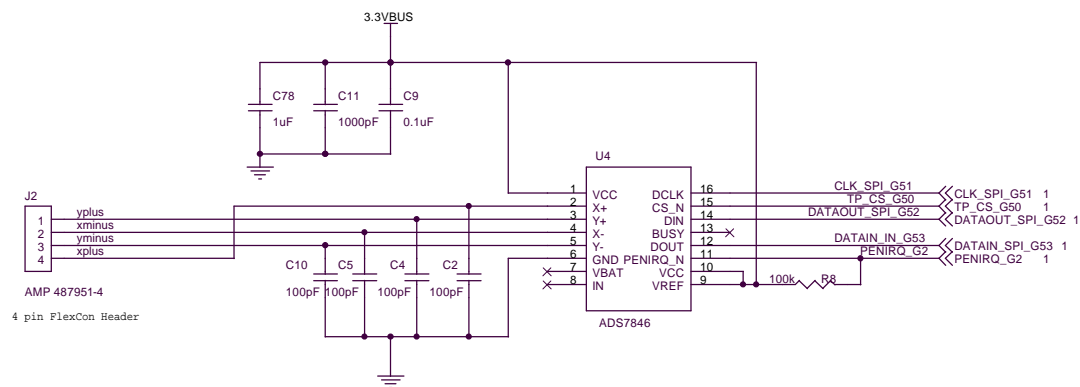


All cap stuff them as near to the chip pin on the bottom side



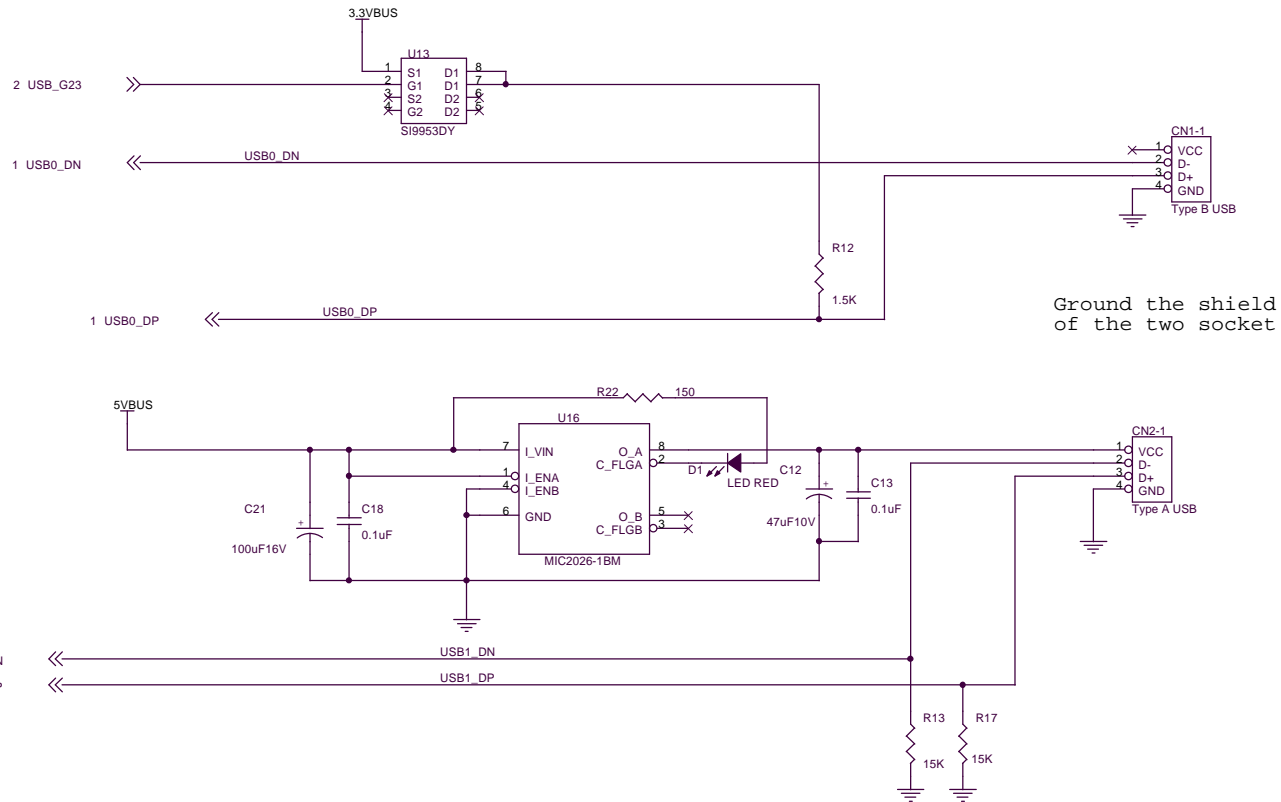
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SD INTERFACE-SPI TOUCHSCREEN



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USB



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